Standard Operating Procedure for Operating the SeaBird 25

LG301

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TABLE OF CONTENTS

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1.0 INTRODUCTION

1.1 The SeaBird 25 consists of a package of sensors and electronics that allow collection of various determinations of water quality *in situ*. The value from each sensor is converted to a digital signal and stored in memory within the package and/or transmitted serially, via a two wire cable, to a computer onboard a vessel. The electronics are housed in a stainless steel cylinder with waterproof electrical connectors for attachment of the various sensors and the cable to the computer. The package is secured inside a protective steel frame which is attached to a steel pedestal framework that allows the sensor package to be about one meter off the bottom of the lake when the pedestal framework is sitting on the lake bottom. The sensors include: depth, temperature, electrical conductivity, optical transmission, a sensor for measuring photo-synthetically active radiation, a fluorometer with filters for chlorophyll detection, pH electrode, and a dissolved oxygen sensor. Readings from each sensor can be taken automatically about 1, 2, 4, or 8 times per second. For Dissolved Oxygen (DO) surveys, use 4 times per second.

2.0 EQUIPMENT AND OPERATION

2.1 The latest Dissolved Oxygen sensor, DO 43, gradually loses sensitivity even when it is not being used. Two things that can be done to maintain it in top operating condition are: 1) put a 5% sodium sulfite solution on the probe between cruises, and 2) Put a 1% triton X solution on the probe between stations. At the beginning of a station, the probe and pump are flushed into a bucket with 50 to 100 mL of water. The bucket is drained into the onboard holding tank (the sink). At the conclusion of the cast, 10 to 20 mL of triton X is added to the pump and probe via the plastic tube. At the end of a survey, when the probe is not planned for use for a week or longer, the probe is loaded with 5% sodium sulfite (10 to 20 mL).

2.2 The instrument array can be controlled by a DOS program called “TERM25” or a windows program called “SBEdataprocessing.” Each is menu driven, but requires time/experience for familiarization. In either case, the SB25 is connected to the computer through a serial port and communication is established.

2.3 If the SB25 is to be operated in a standalone mode with later downloading of the results, it is first connected to the computer for configuration, wherein one can determine the number of casts that are stored, the amount of free memory, the battery condition, etc. Configure it to the Quiescent or Ready State before disconnecting or wait at least 3 minutes before switching on after disconnecting. After disconnecting from the computer port, install electrical connector **plug** on SeaBird, for a water seal over the electrical terminals. Screw on the locking outer hard plastic cap to seat the inner rubber plug.

2.4 Remove the Tygon tubing from the water inlet to the conductivity and dissolved oxygen probes.

2.5 If not already done, place the SeaBird on the cage extension, matching the rectangular SeaBird cage with the extension top rectangle. Clamp the SeaBird and extension together.

2.6 Attach the SeaBird to the hydro wire with the “D” buckle from the cage to the wire loop, not the hook.

2.7 Fasten the safety line from the SeaBird cage to the hydro wire, independently of the hooks, rings, or clamps normally used to attach the SeaBird to the wire.

2.8 Switch **ON** the SeaBird just before deploying the instruments into the water.

2.9 Set the meter wheel of the deploying cable to "0" with the bottom of the SeaBird cage, not the extension, at the surface of the water. Then lower the SeaBird one meter to fully submerse it.

2.10 Wait at least 40 seconds for the DO water pump to come on. The pump activates 40 seconds after the conductivity probe registers a certain minimum conductance. Wait another 2 minutes (3 minutes total) to allow the DO probe to equilibrate to the water temperature and ionic strength.

2.11 Make a slow downcast, about ¼ to ½ meter/second.

2.12 With the SeaBird at the bottom resting on the cage extension, allow the SeaBird to continue taking readings for 1 minute.

2.13 Raise the SeaBird *slowly (¼ meter/sec)* from the bottom to get a good upcast for dissolved oxygen in the hypolimnion, at least through the thermocline.

2.14 Retrieve the SeaBird onto deck. **Turn off the switch**. If necessary, disconnect the safety wire and hydro-wire attachment.

2.15 Reattach the Tygon tubing to the water inlet for the DO sensor and fill it with deionized water.

[Important tip: If a SeaBird 25 cast profile for dissolved oxygen appears erratic or perhaps unresponsive to water column conditions, even though the temperature profile appears proper, CHECK THE INSTRUMENT STATUS HEADERS FOR THE MINIMUM CONDUCTIVITY REQUIRED TO TURN ON THE PUMP. It should be "0." Higher numbers are used for seawater, and the pump will not operate in fresh water.]

3.0 DATA REDUCTION AND REPORTING

3.1 Reconnect the computer serial port to the SB25 connector and establish communication using either "TERM25" or "SBEdataprocessing." Download the last cast to the computer hard drive naming the file such as to identify it preferably with seven or eight characters (i.e., "E061G01.hex" or "E061G01a.hex" for the first or second cast in August 2001 station Erie 61). Disconnect the serial port from the SB25 and replace the dummy plug in the pigtail. Run "seasave" to display the parameters of interest from the ".hex" file. Convert the ".hex" file to a ".cnv" file using "datcnv.exe" or "SBEdataprocessing" and verify that the conversion was successful. Copy the ".hex" and ".cnv" files to back-up storage.

3.2 The complete SeaBird profiles will be captured at half-meter intervals. In addition, bottle-specific SeaBird information also will be developed during upload to GLENDA.